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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Benjamin R. Clifton

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EXAMINER

SCHECHTER, ANDREW M


ART UNIT

PAPER NUMBER

2871

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/877,546	Applicant(s) CLIFTON ET AL.	
	Examiner Andrew Schechter	Art Unit 2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 14-16, 31, 39-49, 54, 61 and 62 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 61 and 62 is/are allowed.
- 6) ☐ Claim(s) 1-12, 14-16, 31, 39-49 and 54 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>6/8/01</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. The indicated allowability of the subject matter of the previous claims 13 and 47 is withdrawn in view of the newly discovered reference(s) to *San-Nohe et al.*, U.S. Patent No. 5,371,559. Rejections based on the newly cited reference(s) follow.

Claims 13 and 47 were previously indicated as containing allowable subject matter, in particular the additional limitation that the optimal ray angle is in a range from about 0° to about 10°. However, the reference *San-Nohe*, made of record by the applicant, provides a clear teaching that the optimal angle should be approximately 5°, within the recited range, in order to maximize contrast ratio. Rejections based on this reference follow.

Claim Objections

2. Claim 47 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

The limitation of claim 47 was amended to claim 39 from which it depends.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3-7, 9-12, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Ogino*, U.S. Patent No. 5,758,940 in view of *Tejima et al.*, U.S. Patent No. 4,936,657, in view of *Gold et al.*, U.S. Patent No. 5,450,219, and in view of *San-Nohe et al.*, U.S. Patent No. 5,371,559.

Ogino discloses [see Fig. 1a] a high performance image projection apparatus comprising a light source [1] having an effective source size and emitting a principal light ray [the horizontal ray] and an associated bundle of polychromatic light rays [see Fig. 1c: the light has red, green, and blue components, hence it is polychromatic] and an LCD panel [3] adapted to form a light pattern [the image on the screen 6] in response to the incident polychromatic light rays emitted from the light source and applied with signals carrying light pattern information [this is inherent, since LCDs must be given such signals in order to produce the desired image]. The LCD panel has a major surface. *Ogino* does not disclose the remaining limitations of claim 1, that there is an optical lens device positioned to receive, and having optical light directing properties to steer, the principal light ray and associated bundle of polychromatic light rays, for incidence on the LCD panel at substantially the same optimal ray angle that contributes

to formation of the light pattern at a contrast ratio of at least 1000:1, the optimal ray angle being in a range from about 0° to about 10° from normal to the major surface.

Tejima discloses [see Fig. 22] an analogous image projection apparatus with a light source [5] and LCD [1], which does have an optical lens device [4] positioned to receive, and having optical light directing properties to steer, the principal light ray and associated bundle of polychromatic light rays, for incidence on the LCD panel at substantially the same optimal ray angle that contributes to formation of the light pattern at a high contrast ratio. It would have been obvious to one of ordinary skill in the art at the time of the invention to use this optical lens device in the device of *Ogino*, motivated by *Tejima*'s teaching that this causes the light to be "refracted by the eccentric lens surface such that it is substantially parallel to the inclination of the reorientation of the long axes of the liquid-crystal molecules" [col. 7, lines 18-21], which provides an improvement in the contrast, brightness, light efficiency, and display quality [see col. 1, lines 10-34 and col. 2, line 55 – col. 3, line 17].

The device of *Ogino* in view of *Tejima* produces a high contrast ratio as described above, but there is no explicit disclosure that this produces a contrast ratio of at least 1000:1. The contrast ratio of a projection LCD system is a result-effective variable, whose optimization achieves a recognized result, as evidenced by *Gold*'s teaching that increasing the contrast thereby enhances the projector performance [see abstract]. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to optimize the contrast ratio, making it be greater than about

1000:1, motivated by the desire to improved the projector performance by having a high contrast ratio.

The above references do not disclose the final limitation of claim 1, that the optimal ray angle is in a range from about 0° to about 10° from normal to the major surface. *San-Nohe* discloses [see Fig. 9, etc.] an analogous LCD projection system where the light is incident on the LCD panel at an optimal ray angle in order to maximize contrast, and teaches that the optical ray angle is between 0° and 9°, with a peak at about 5°. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use an optimal ray angle in the range between 0° and 10° as recited in claim 1, motivated by *San-Nohe's* teaching that the highest contrast ratio is achieved when the alignment direction of the liquid crystal molecules coincides with the traveling direction of the incident light ray, and that this occurs at an angle of about 5° [col. 1, line 57 – col. 2, line 14, and see Fig. 9].

Claim 1 is therefore unpatentable.

Ogino's panel diagonal is greater than 50 mm [250 mm, col. 1, line 22], so claim 3 is unpatentable. A panel diagonal of 250 mm is in the category of typical direct view panel sizes (~10 inches or more), as opposed to typical projection cell panel sizes (a few centimeters or less), so it is “about 380 millimeters” and claim 4 is unpatentable.

Regarding claims 5 and 6, *Ogino* does not disclose the magnification ratio of the projection lens [5] in the above-discussed embodiment. Since the panel diagonal is 250 mm, a magnification between 4x and 10x would produce an image on the screen between 1 and 2.5 meters in diagonal. *Ogino* discloses [albeit in a different

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embodiment, see examples in Fig. 22-24, col. 15, lines 34-35, for instance] projecting images in this size range. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a magnification between 4x and 10x, thereby projecting images in this size range as disclosed by *Ogino*, motivated by the desire to project an image sized appropriately for typical conference room projection screens and home theatre-style rear projection systems. Claims 5 and 6 are therefore unpatentable.

The projection lens [5] in *Ogino* includes 5 or fewer optical lens elements, so claim 7 is also unpatentable.

Regarding claims 9 and 10, *Ogino* does not disclose the operational life of the LCD panel before substantial color degradation being greater than 50,000 hours, nor the resolution of the LCD panel being SXGA or higher. However, long life and high resolution are well-known goals in the LCD art; they are result-effective variables whose optimization achieves a recognized result, namely enhancing the projector performance by making it last longer or have a higher image quality. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to optimize the lifetime and resolution of the display, making the lifetime longer than the recited 50,000 hours and the resolution SXGA or higher, motivated by the desire to improve the quality of the display device by making it last longer and have higher resolution. Claims 9 and 10 are therefore unpatentable.

Regarding claim 11, *Ogino* discloses [albeit in a different embodiment, see Figs. 22a,b] the use of a projection screen and rear screen projector arrangement. It would have been obvious to one of ordinary skill in the art at the time of the invention to set up

such an arrangement, as disclosed by *Ogino*, for the above-described LCD projector, motivated by the commercial value of producing such home theatre-style systems which provide a compact, large-screen display system for multiple viewers. Claim 11 is therefore unpatentable.

The optical lens device [4 in *Tejima*, see Fig. 22] includes an input Fresnel lens, so claim 12 is also unpatentable. The input Fresnel lens has an optical center and the principal ray enters the input Fresnel lens at a position offset from the optical center, so claim 14 is also unpatentable.

Regarding claim 15, *Tejima* (in addition to disclosing and teaching the use of an input Fresnel lens, as discussed above) discloses [see Fig. 6] an output Fresnel lens which receives the principal ray from the LCD panel and refracts it so that it exits the Fresnel lens perpendicularly. It would have been obvious to one of ordinary skill in the art at the time of the invention to use this output Fresnel lens (along with the input Fresnel lens previously discussed) motivated by *Tejima*'s teaching that this arrangement "permits the use of a projection optical system having a small viewing angle and a small aperture while enabling not only efficient utilization of the illuminating light but also easy access of the display to the viewer" [col. 3, lines 3-7]. Claim 15 is therefore unpatentable.

Regarding claim 16, *Ogino* discloses that bundle of light rays propagating through the LCD panel has an angle of divergence that must be about 0.25 rad (~14 degrees) or less [col. 1, lines 49-50] and the smaller the better, since this results in a higher contrast ratio. The examiner understands this to be a ± 7 degree cone angle

relative to the angle of the principal light ray, which is "about ± 6 degree or less", so claim 16 is also unpatentable.

5. Claims 2, 31, 39-49, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Ogino*, *Tejima*, *Gold*, and *San-Nohe* as applied to claim 1, and further in view of *Levis et al.*, U.S. Patent No. 5,884,991 and *Toide et al.*, U.S. Patent No. 5,135,300.

Ogino is silent on the effective source size of its light source, so it does not disclose the additional limitation of claim 2 that the effective source size ranges from about 1 mm to about 7 mm.

Levis discloses [see Figs. 2 and 3, for instance], for an analogous LCD projection system with a 227 mm diagonal panel [col. 9, lines 47-48], using a arc lamp whose arc gap dimension is from 1-6 mm (a specific example is given which is 3 mm) [col. 8, lines 27-31]. Furthermore, *Toide* discloses a 5 mm light source that "is conventionally used as a light source" [col. 2, lines 46-48]. Further, *Toide* explains that such a size is chosen to balance the needs to be "as close to a point source as possible and ... [have] a sufficient life necessary for the apparatus" [col. 2, lines 28-45]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use *Levis*' arc lamp, having an effective source size (arc gap dimension) in the range from 1 mm to 7 mm as recited, motivated by *Toide*'s teaching that sources of this size have been "conventionally designed and developed" to optimize the considerations discussed above. (The examiner notes that *Toide* proposes another lighting means as an improvement over this; however, this "teaching away" does not make the combination

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unobvious. First, "a known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use" [see MPEP 2145] and second, the references do not explicitly teach away from the combination.) Claim 2 is therefore unpatentable.

The additional limitation of claim 31 over those of claim 1 is that the effective source size is 2% or less of the panel size. Given the 3 mm arc gap dimension of *Levis* and the 250 mm panel size [col. 1, line 22] of *Ogino* [or for that matter, the 227 mm panel size of *Levis*], the above-described device meets this claim limitation. Claim 31 is therefore unpatentable.

The optical element [4 in *Tejima*, see Fig. 22] comprises a Fresnel lens that has an optical center and in which the principal ray enters the Fresnel lens at a position offset from the optical center to set the angle of incidence of the principal light ray on the LCD panel, so claims 39 and 48 are also unpatentable. Claim 47 repeats a limitation already in claim 39, so claim 47 is also unpatentable.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have the maximized contrast ratio be at least 1000:1 as discussed above regarding claim 1, so claim 40 is also unpatentable. The effective source size is in the range from 1 to 7 mm, so claim 41 is also unpatentable. The LCD panel diagonal dimension is greater than 50 mm, and about 380 mm, as discussed above regarding claims 3 and 4, so claims 42 and 43 are also unpatentable.

Regarding claim 44, *Ogino* does not disclose the magnification ratio of the projection lens [5] in the above-discussed embodiment. Since the panel diagonal is 250

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mm, a magnification between 4x and 10x would produce an image on the screen between 1 and 2.5 meters in diagonal. *Ogino* discloses [albeit in a different embodiment, see examples in Fig. 22-24, col. 15, lines 34-35, for instance] projecting images in this size range. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a magnification between 4x and 10x, thereby projecting images in this size range as disclosed by *Ogino*, motivated by the desire to project an image sized appropriately for typical conference room projection screens and home theatre-style rear projection systems. Claim 44 is therefore unpatentable.

The projection lens [5] in *Ogino* includes 5 or fewer optical lens elements, so claim 45 is also unpatentable. Regarding claim 46, *Ogino* discloses [albeit in a different embodiment, see Figs. 22a,b] the use of a projection screen and rear screen projector arrangement. It would have been obvious to one of ordinary skill in the art at the time of the invention to set up such an arrangement for the above-described LCD projector, motivated by the commercial value of producing such home theatre-style systems which provide a compact, large-screen display system for multiple viewers. Claim 46 is therefore unpatentable.

Regarding claim 49, *Tejima* (in addition to disclosing and teaching the use of an input Fresnel lens, as discussed above) discloses [see Fig. 6] an output Fresnel lens which receives the principal ray from the LCD panel and refracts it so that it exits the Fresnel lens perpendicularly. It would have been obvious to one of ordinary skill in the art at the time of the invention to use this output Fresnel lens (along with the input Fresnel lens previously discussed) motivated by *Tejima*'s teaching that this

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arrangement "permits the use of a projection optical system having a small viewing angle and a small aperture while enabling not only efficient utilization of the illuminating light but also easy access of the display to the viewer" [col. 3, lines 3-7]. Claim 49 is therefore unpatentable.

The light source includes an arc lamp with arc gap dimension two percent or less than the panel diagonal dimension as discussed above, so claim 54 is also unpatentable.

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Ogino*, *Tejima*, *Gold*, and *San-Nohe* as applied to claim 1, and further in view of *Shimada*, U.S. Patent No. 5,710,609.

Ogino does not disclose that the LCD panel has amorphous silicon thin film transistors. *Shimada* does disclose using amorphous silicon TFTs in an analogous projection LCD system. It would be obvious to one of ordinary skill in the art at the time of the invention to use amorphous silicon TFTs, motivated by *Shimada's* teaching that amorphous silicon TFTs are among those types of TFTs which "are all suitable for use as a TFT" in such devices [col. 6, lines 10-16]. (The examiner notes that using TFTs, an active-matrix driving scheme, produces a higher display quality than a passive-matrix driving scheme without TFTs, and amorphous silicon TFTs have various advantages over, say, polysilicon TFTs in ease of manufacture and cost, for instance.) Claim 8 is therefore unpatentable.

Allowable Subject Matter

7. Claims 61 and 62 are allowed.
8. The following is a statement of reasons for the indication of allowable subject matter:

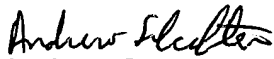
The prior art does not disclose the device of claims 61 or 62, in particular the limitations that the projection apparatus with the LCD panel has multiple arc lamps, multiple fold mirrors in the form of a pinwheel-shaped mirror configuration so that the bundle of light rays is substantially collimated, and a flyseye lens array light homogenizer system. Claims 61 and 62 are therefore allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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1 September 2004